

In re Appln. of CHEN
Application No. 10/714,059

AMENDMENTS

IN THE CLAIMS:

Please amend claims 1, 2, 3, 10, and 17 and add new claim 18, as indicated below in the listing of claims.

Listing of Claims

1. (Currently Amended) A pressure control valve for controlling two pressure load paths, the pressure control valve comprising:
 - a housing defining a single primary input pressure path, a first load path, and a second load path, a first drain path, and a second drain path, the housing including a cavity therein;
 - a spool, the spool slidably disposed in the cavity of the housing; and
 - a dual proportional actuator including a movable plunger, the plunger in operative engagement with the spool, the actuator selectively operable to move the spool via the plunger in a first direction or a second direction, the actuator operable to dispose the spool in a neutral position wherein the first and second load paths are blocked and the first and second drain paths are open, a first control position wherein the first load path is open and the second load path is blocked, the first drain path is blocked and the second load path is open, and a second control position wherein the second load path is open and the first load path is blocked, the second drain path is blocked and the first drain path is open.
2. (Currently Amended) The valve according to claim 1 wherein the housing defines a primary pressure port in communication with the primary pressure path, first and second load ports, and first and second tank ports, the first load port being selectively connected to the primary pressure port via the first load path, the second load port selectively connected to the primary pressure port via the second load path, and the first and second load ports being respectively selectively connected to the first and second tank ports via the first and second drain paths.

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3. (Currently Amended) The valve according to claim 2 wherein moving the spool in the first direction ~~a predetermined distance from a~~ the neutral position to the first control position blocks communication between the ~~second first~~ first tank port and the ~~second first~~ first load port and maintains the connection of the ~~first second~~ first tank port and the ~~first second~~ first load port, and moving the spool in the second direction ~~a predetermined distance from a~~ the neutral position blocks communication between the ~~first second~~ first tank port and the ~~first second~~ first load port and maintains the connection of the ~~second first~~ second tank port and the ~~second first~~ second load port.

4. (Original) The valve according to claim 3 wherein the spool includes a plurality of lands, the lands configured such that a first secondary pressure develops at the first load port when the communication between the first tank port and the first load port is blocked and such that a second secondary pressure develops at the second load port when the communication between the second tank port and the second load port is blocked.

5. (Original) The valve according to claim 4 wherein the spool includes a plurality of lands configured to isolate the primary pressure path.

6. (Original) The valve according to claim 4 wherein the spool includes a plurality of lands, at least two of which have different diameters, the spool lands of different diameters defining an area which is exposed to the first secondary pressure to thereby generate a feedback force which acts against a drive force.

7. (Original) The valve according to claim 6 wherein the spool includes at least three lands, the spool lands of different diameters defining an area which is exposed to the first and second secondary pressures to thereby generate a respective feedback force which acts against a respective drive force.

8. (Original) The valve according to claim 1 wherein the spool includes a plurality of lands configured to isolate the primary pressure path.

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9. (Original) The valve according to claim 1 wherein when the actuator is operated an electromagnetic field is generated, and when the spool is in either of the first and second positions, a pressure differential develops within the spool, the spool being configured such that it moves in response to the difference between the differential pressure and the magnetic field of the actuator.

10. (Currently Amended) The valve according to claim 2 wherein the spool includes a differential area associated with each load port, each differential ~~are~~ area being exposed to the pressure in the load port.

11. (Original) The valve according to claim 10 wherein when the actuator is operated an electromagnetic field is generated, and when the spool is in either of the first and second positions, a pressure differential develops within the spool, the spool being configured such that it moves in response to the difference between the differential pressure and the magnetic field of the actuator.

12. (Original) The valve according to claim 1 wherein the dual proportional actuator comprises a pair of solenoid coils.

13. (Original) The valve according to claim 1 wherein the plunger of the dual proportional actuator includes a push pin connected to the spool.

14. (Original) The valve according to claim 1 further comprising:
a cage disposed in the cavity of the housing, the cage fixed with respect to the housing, the spool slidably disposed within the cage.

15. (Original) The valve according to claim 1 further comprising:
a spring engaged with the plunger and the spool, the spring acting to bias the plunger and the spool to a neutral position.

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16. (Original) The valve according to claim 4 further comprising:
a sliding pin disposed inside the spool;
a stop pin configured to be engageable with the sliding pin;
wherein the secondary pressure developed when the communication between the first load port and first tank port is blocked acts on the sliding pin to generate two opposing forces, one of which acts on the spool to stabilize the secondary pressure at the first load port, and the other of which acts on the sliding pin to move the sliding pin against the stop pin.

17. (Currently Amended) A pressure control valve for controlling two pressure load paths, the pressure control valve comprising:
a housing defining ~~a single primary pressure path and at least one port~~ a first load path, a second load path, a first discharge path and a second discharge path, the housing including a cavity therein;
a cage disposed in the cavity of the housing, the cage fixed with respect to the housing;
a spool, the spool slidably disposed within the cage, ~~the spool includes a plurality of lands configured to isolate the primary pressure path;~~
a dual proportional actuator including a movable plunger, the plunger in operative engagement with the spool, the actuator selectively operable to move the spool via the plunger in a first direction or a second direction;
a spring engaged with the plunger and the spool, the spring acting to bias the plunger and the spool to a neutral position wherein the first and second load paths are both closed and the first and second discharge paths are both open;
~~wherein moving the spool in the first direction a predetermined distance from a neutral position blocks communication between the second tank port and the second load port and maintains the connection of the first tank port and the first load port, and moving the spool in the second direction a predetermined distance from a neutral position blocks communication between the first tank port and the first load port and maintains the connection of the second tank port and the second load port.~~

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18. (New) A pressure control valve for controlling two pressure load paths, the pressure control valve comprising:

- a housing defining a primary port, a first load port, a second load port, a first tank port, and a second tank port, the housing including a cavity therein;

- a cage disposed in the cavity of the housing, the cage fixed with respect to the housing;

- a spool, the spool slidably disposed within the cage, the spool includes a plurality of lands configured to selectively isolate the primary port from the first and second load ports;

- a dual proportional actuator including a movable plunger, the plunger in operative engagement with the spool, the actuator selectively operable to move the spool via the plunger in a first direction or a second direction;

- a spring engaged with the plunger and the spool, the spring acting to bias the plunger and the spool to a neutral position wherein the primary port is isolated from the first and second load ports and wherein the first load port is in communication with the first tank port via a first discharge path and the second load port is in communication with the second tank port via a second discharge path;

- wherein moving the spool in the first direction a predetermined distance from the neutral position blocks communication between the second tank port and the second load port, maintains the connection of the first tank port and the first load port, and creates a communication between the primary port and the second load port via a second pressure load path, and moving the spool in the second direction a predetermined distance from the neutral position blocks communication between the first tank port and the first load port, maintains the connection of the second tank port and the second load port, and creates a communication between the primary port and the first load port via a first pressure load path.